Contribution ID: **37** Type: **Plenary**

Accelerated graph building for particle tracking graph neural nets

Wednesday 1 June 2022 10:00 (25 minutes)

The CMS experiment is undergoing upgrades that will increase the average pileup from 50 to 140, and eventually 200. The high level trigger at CMS will experience an increase in data size by a factor of five. With current algorithms, this means that almost 50% of the high level trigger time budget is spent on particle track reconstruction. Graph neural nets have shown promise as an alternative algorithm for particle tracking. They are still subject to several constraints, e.g. momentum cuts, or not allowing for missing hits in a track. The graphs also have several orders of magnitude more fake edges than real, causing slow graph building. Alternative ways of building the graphs are explored to address these limitations. Reinforcement learning and seeded graph building are both introduced as potential alternatives. Some preliminary results suggest that reinforcement learning can result in quicker graph building with fewer physics restrictions.

Consider for young scientist forum (Student or postdoc speaker)

Yes

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Session Classification: Plenary